Space Weather Forecast

Issued on Sunday 22 December 2024 at 00:27 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Minor/Moderate radio blackouts likely. Uncertainty in geomagnetic forecast.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Moderate due to a single impulsive low level Moderate-class flare at 21/0038 UTC from a moderately large region in the southeast.

There are currently ten sunspot regions on the visible disc. A former moderately large and elongated region in the southeast is now split into two regions, with the larger trailing eastern bipolar portion newly numbered. Other recent changes include newly numbered bipolar region toward the northeast limb, and some further minor growth in the still relatively small bipolar region in the southwest quadrant. The southeastern quadrant contains a cluster of the largest and most complex regions on the disc; the already mentioned regions above, along with two further moderately large bipolar regions located to the south. Remaining regions are relatively small, stable and magnetically simple.

Confidence in the complex numberr of Coronal Mass Ejections (CMEs) is currently low.

A filament (arc of plasma) lift-off from the northeast from late in the UTC day on 20 Dec was modelled and gives a potential peripheral glance around 24/0000 UTC.

A number of other CMEs (coronal mass ejections) have been observed in available imagery during the period, mainly concerning near limb filament lift-offs, with analysis ongoing to determine if any present a possible Earth directed component.

Solar Wind / Geomagnetic Activity: Solar winds have shown elevated conditions with uncertain cause - perhaps connection to an unseen westward promontory from a central 'coronal hole' in the southwestern quadrant. The solar wind speed showed a gradual, erratic increase from Slightly Elevated to Elevated levels. The number of particles in the solar wind were at background. The associated magnetic field was slightly elevated at times, with an erratic north-south component.

Geomagnetic activity was Quiet to Active Kp (2 to 4), peaking in the 21/0300-0600UTC interval, as measured by BGS.

Energetic Particles / Solar Radiation: High energy proton flux gradually increased in the period before levelling off over the past few hours but remained sub-Minor Solar radiation storm level.

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 370 900 0100 Email: enquiries@metoffice.gov.uk

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Four-Day Space Weather Forecast Summary

Solar Activity: Isolated Moderate-class flares are likely, mainly from the regions in the southeast quadrant, and perhaps bolstered slightly after the current UTC weekend by returning regions. A slight chance of isolated Strong-class flares is maintained throughout.

Solar Wind / Geomagnetic Activity:

A filament lift-off from the northeast from late in the UTC day on 20 Dec was modelled and gives a potential peripheral glance around 24/0000 UTC. There are also a number of other CMEs (coronal mass ejections) observed during the period which are yet to be fully assessed, but these appear to be directed off the Sun-Earth line in the main.

Overall, and given now-Elevated solar wind speeds, there is a Slight Chance of Minor Storm G1 conditions through the period, tentatively peaking around days 2 and 3 (23 and 24 Dec) due to CH01/-and possible glancing influence from 20 Dec CME.

Energetic Particles / Solar Radiation: There is a slight chance of Solar Radiation storms in the current UTC weekend due to current slightly enhanced near-Earth proton counts. This risk should relax back in the absence of any significant flares, with most of the risk from the front-side then tied to the westward advance of the cluster of southeastern sunspot regions.

Geomagnetic Storms

Geomagnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	5	10	20	5
Strong	G3	No	1	1	5	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

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Radio Blackouts - X-Ray Flares

X-Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 (M Class)	Yes	65	70	75	75
Very Active	R3-R5 (X Class)	No	10	10	10	10

Solar Radiation Storms (High Energy Protons)

Radiation Storms	Level ($cm^{-2}sr^{-1}s^{-1}$)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	20	15	20	20
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and/or 50 MeV ≥ 10pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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